

Flash3D EDL Sensor Technology Advancement, Phase I

Completed Technology Project (2009 - 2009)



Project Introduction

Advanced Scientific Concepts Inc. (ASC) is a small business, which has developed a number of 3D flash LADAR systems. Flash Ladar sensors are 3D video systems that return range and intensity information for each pixel in real time, and is functionally equivalent to 16000 range finders on one chip. Actual data collected, at the JPL mars yard, using ASC's compact Flash Ladar system demonstrated in a previous NASA phase I SBIR effort confirm that the ASC Flash LADAR Video Camera (FLVC) system can meet the requirements for Entry, Descent and Landing (EDL). The FLVC's small size, low power and very fast range data frame rate (30Hz) make the sensor ideal for EDL missions. Flash Ladar is ideal for determining real-time spacecraft trajectory, speed, orientation, and range to the planet surface, as well as evaluating potential hazards at the landing site. Sloped ground, craters, rocks and surface composition are among the potential hazards. The "framing camera" nature, of Flash LADAR systems, makes them well suited as hazard avoidance sensors for EDL. An existing Phase two effort is fabricating a compact FLVC for delivery to NASA for field testing, however the system is not hardened. A proposed Phase 2 effort would produce a space qualified sensor engine which can be integrated with the system being delivered to NASA. The sensor engine is the break-through enabling technology for the FLVC. This proposed effort will develop techniques to improve the sensors measurement accuracy. ASC will develop improved calibration techniques, improved sensor non-uniformity and improved on-board real time automatic range correction. This will target range resolutions of better than 1cm and range absolute accuracy better than 3cm. The Phase 2 effort would deliver to NASA a commercial based system with the enhancements developed during Phase 1

Anticipated Benefits

Potential NASA Commercial Applications: ASC is pursuing many non-NASA applications. Collision/Pedestrian Avoidance Automotive Collision Avoidance Helicopter landing in Brown-Out Conditions, Mid-Air Refueling Surveillance Terrain Mapping Autonomous Navigation for Unmanned Vehicles Smart intersection Robotics and Machine Vision Underwater 3D Imaging Sub Nanosecond Dynamic Imaging 3D Sports Imaging



Flash3D EDL Sensor Technology Advancement, Phase I

Table of Contents

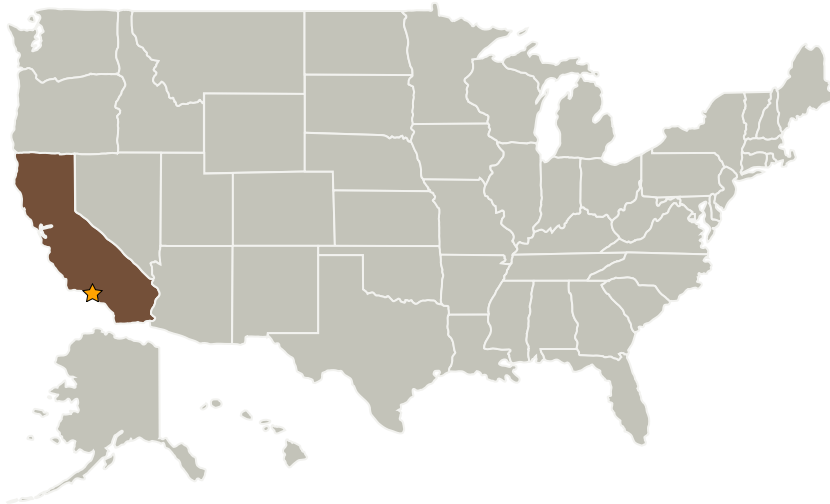
Project Introduction	1
Anticipated Benefits	1
Primary U.S. Work Locations and Key Partners	2
Project Transitions	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	2
Technology Areas	3

Flash3D EDL Sensor Technology Advancement, Phase I

Completed Technology Project (2009 - 2009)



Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★ Jet Propulsion Laboratory (JPL)	Lead Organization	NASA Center	Pasadena, California
Advanced Scientific Concepts, Inc.	Supporting Organization	Industry	Goleta, California

Primary U.S. Work Locations

California

Project Transitions

January 2009: Project Start

July 2009: Closed out

Closeout Summary: Flash3D EDL Sensor Technology Advancement, Phase I Project Image

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

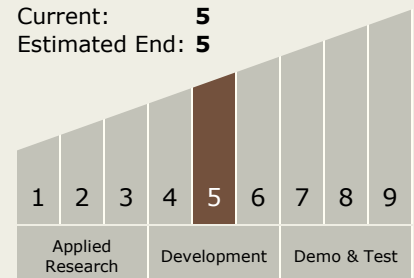
Carlos Torrez

Principal Investigator:

Steve Silverman

Technology Maturity (TRL)

Start: **5**
 Current: **5**
 Estimated End: **5**



Flash3D EDL Sensor Technology Advancement, Phase I

Completed Technology Project (2009 - 2009)



Technology Areas

Primary:

- TX09 Entry, Descent, and Landing
 - └ TX09.4 Vehicle Systems
 - └ TX09.4.7 Guidance, Navigation and Control (GN&C) for EDL